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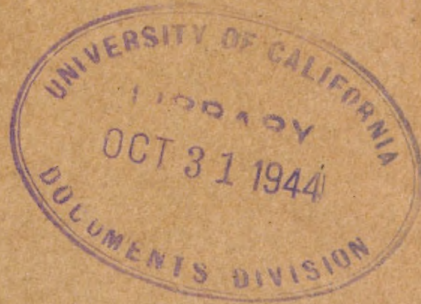
TECHNICAL MANUAL

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CEILING LIGHT PROJECTORS

ML-121-A, B, C, E, F AND G

June 26, 1943



CEILING LIGHT PROJECTORS ML-121-A, B, C, E, F AND G

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NOTE: Because of the basic similarity between all the Ceiling Light Projectors covered by this Manual, general references to the equipment are written ML-121-(*) instead of giving a suffix letter.

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DESTRUCTION NOTICE

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WHY—To prevent the enemy from using or salvaging this equipment for his benefit.

WHEN—When ordered by your commander, or when you are in immediate danger of capture.

HOW—1. Smash—Use sledges, axes, hand-axes, pick-axes, hammers, crow-bars, heavy tools, etc.
2. Cut—Use axes, hand axes, machete, etc.
3. Burn—Use gasoline, kerosene, oil, flame-throwers, incendiary grenades, etc.
4. Explosives—Use firearms, grenades, TNT, etc.
5. Disposal—Bury in slit trenches, fox-holes, other holes. Throw in streams. Scatter.
6. USE ANYTHING IMMEDIATELY AVAILABLE FOR DESTRUCTION OF THIS EQUIPMENT.

WHAT—1. Smash—All glass and ceramic (porcelain) parts, castings and terminal boards.
2. Cut—All wiring, cable, gaskets, etc.
3. Bend and/or break—retaining rings, bezels, moisture seals and screening.
4. Burn—Charts, tables, notebooks, records, books and reports.
5. Bury or scatter—Any or all of the above pieces after breaking.

DESTROY EVERYTHING

NOTICE

Ceiling Light Projector ML-121-(*) has been accurately focused during manufacture so that when the lamp is correctly placed in the socket, the lamp filament will be at the focal point of both primary and secondary reflectors. NO FURTHER ADJUSTMENT IS REQUIRED IN THE FIELD.

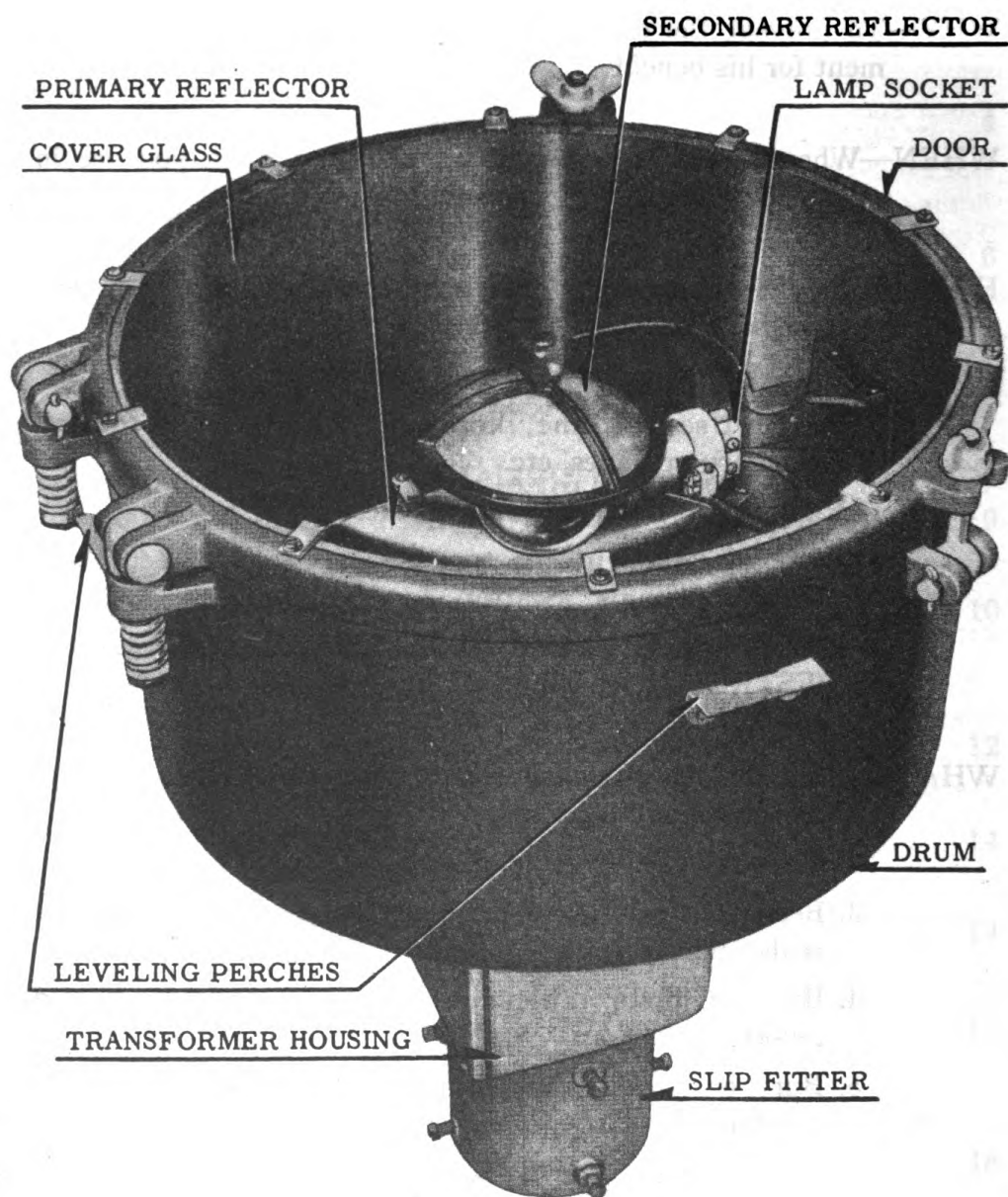


Fig. 1—Ceiling Light Projector ML-121-(*)

SECTION I

DESCRIPTION

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1. General

a. Ceiling Light Projector ML-121-(*) is used to project a narrow vertical beam of light from the ground to illuminate a spot on the clouds. By means of an instrument, such as a clinometer, it is possible to sight on the illuminated spot and read the angle of elevation. Ceiling height, in feet, may be determined by reference to a simple table or curve. An instrument having a scale calibrated directly in feet may also be used. When using an instrument without magnification (as is usually the case) the projector may be used for measurements up to approximately 6000 feet.

b. The ceiling light projector consists of a weathertight drum which contains an optical system, composed of a primary reflector, secondary reflector and socket assembly which contains a prefocus-base lamp. The supporting base contains the transformer for operating the lamp.

2. Weights and Dimensions

a. The net weight of the complete assembly, consisting of the drum, the optical system, the transformer, and the supporting base, is 127 pounds if cast iron, 82 pounds if cast aluminum.

b. The maximum diameter of the assembly is $21\frac{1}{2}$ inches; height, $28\frac{3}{4}$ inches.

NOTE: The cover glass for this projector is procured as a "set", which includes the cover glass and all pads, cement, and sealing compound required for the installation of the new cover glass.

3. Power Source

A 60-cycle source of alternating current is required, supplying a voltage of from 90 to 120 volts at the projector when the lamp is turned on.

NOTE: Ceiling Light Projector ML-121-A is designed for a 25-cycle a-c supply.

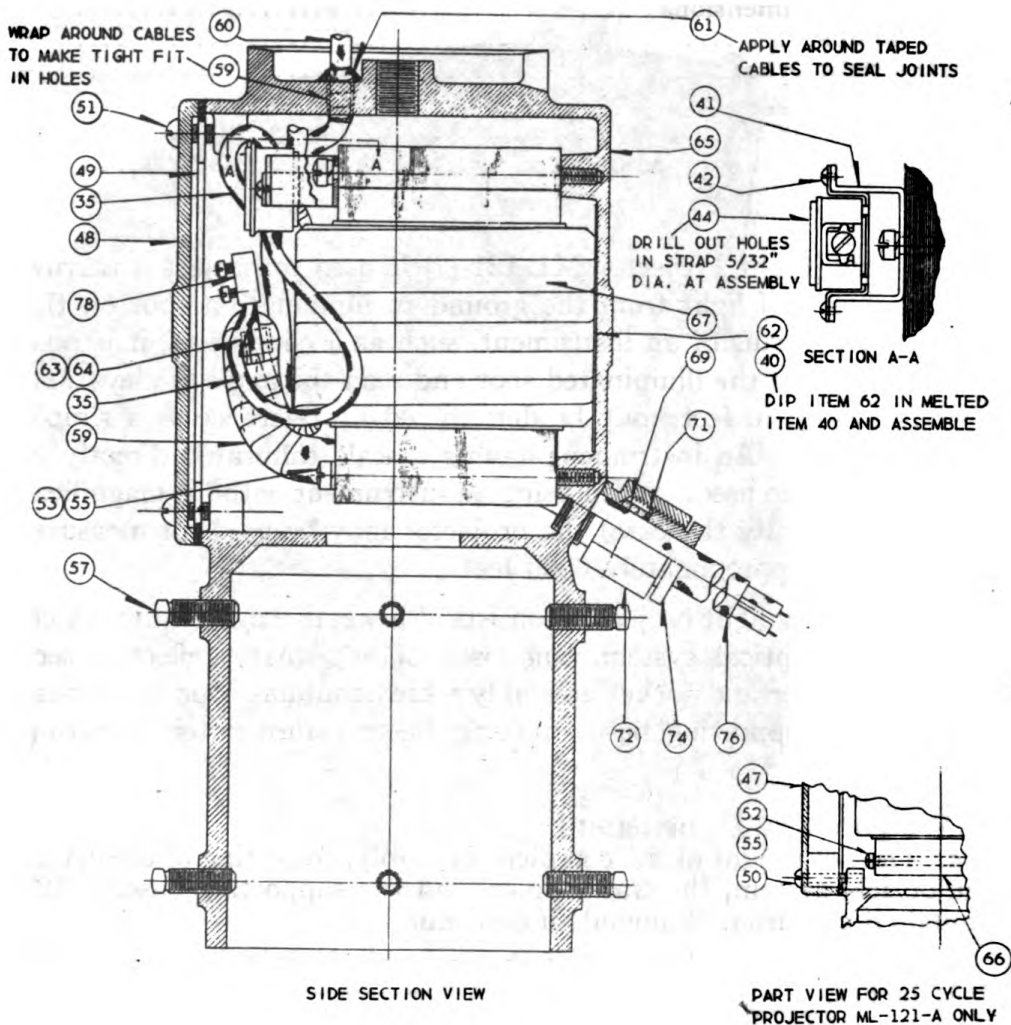


Fig. 2—Ceiling Light Projectors ML-121-A and B, Transformer and Mounting Case Assembly

4. Weathertight Drum

The projector drum provides a weatherproof housing for the parts and holds them in place in their correct positions. The drum is cast in one piece. There is a half-inch hole, covered with insect-proof wire mesh at the bottom to drain any moisture which may accumulate (by condensation) inside the drum. The cover glass is mounted in a cast bezel, or door frame, hinged to the drum at one side to permit ready access to the interior for cleaning and relamping. The joint between the cover glass and the bezel is sealed with compound to make it weatherproof, while a gasket in the bezel seals the joint at the edge of the drum. On Ceiling Light Projectors ML-121-C, E, F and G two leveling perches are provided on the outside of the drum, 90° apart, on which to set the small level furnished with the projector.

5. Optical System

The optical system consists of the following:

a. Lamp

The lamp is a 420-watt, 12-volt, 35-ampere, G-25 bulb, mogul pre-focus base, airplane headlight lamp. During manufacture, the lamp filament is accurately located in relation to the prefocus base, making it unnecessary to focus whenever a new lamp is installed. Two lamps, packed separately, are furnished with each projector.

b. Primary Reflector

This reflector is a 16-inch, back-silvered glass, parabolic mirror. It is rigidly fastened to padded bosses at the bottom of the drum. The primary reflector collects all the light rays falling on its surface (from the lamp filament and the secondary reflector) and redirects them into a concentrated beam with all rays parallel.

c. Secondary Reflector

This reflector is a 5-inch silvered glass, spherical mirror. It is rigidly mounted on an arm of the socket assembly so that the focal point of the reflector and the lamp filament coincide. In this position, the secondary reflector intercepts the otherwise wasted direct light from the lamp and redirects it through the lamp filament to the primary reflector, where the light is added to the main beam.

d. Socket Assembly

The socket assembly consists of a cast pedestal rigidly supporting a mogul prefocus socket and the secondary reflector. The position of the socket and the secondary reflector are accurately adjusted during manufacture so that when the lamp is placed in its socket, the filament will be in the correct position with respect to both the primary and secondary reflectors.

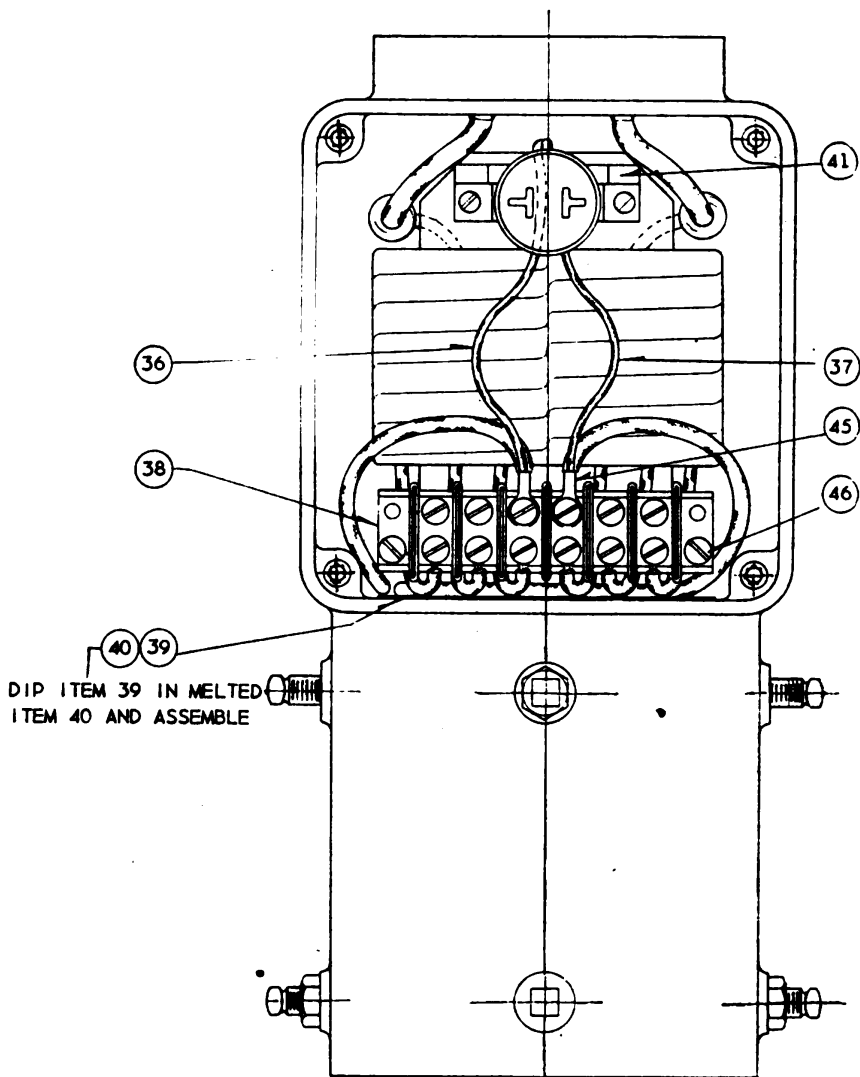


Fig. 3—Ceiling Light Projectors ML-121-C, E, F and G, Transformer and Mounting Case Assembly, Front View.

Ceiling Light Projectors ML-121-A, B, C, E, F and G

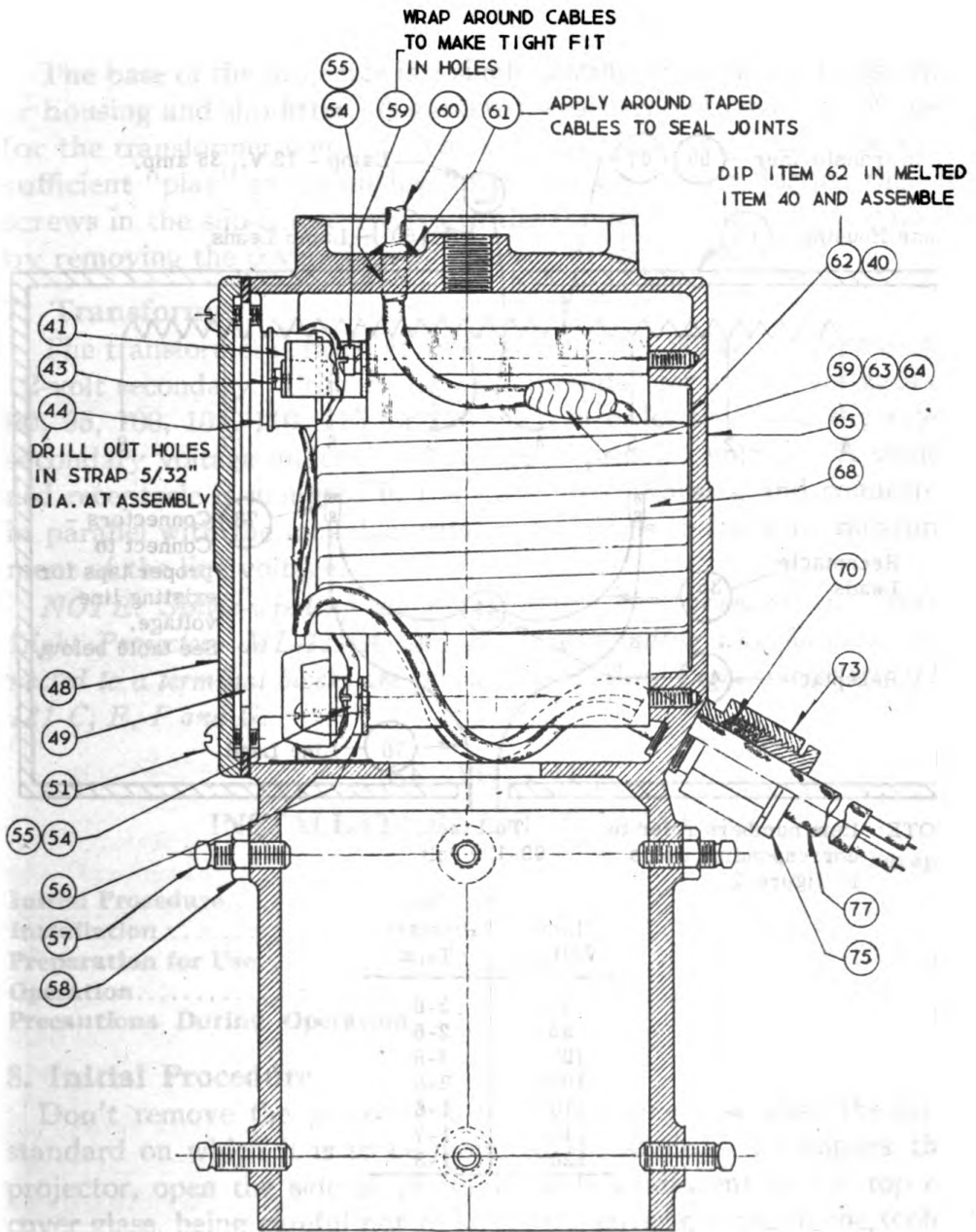
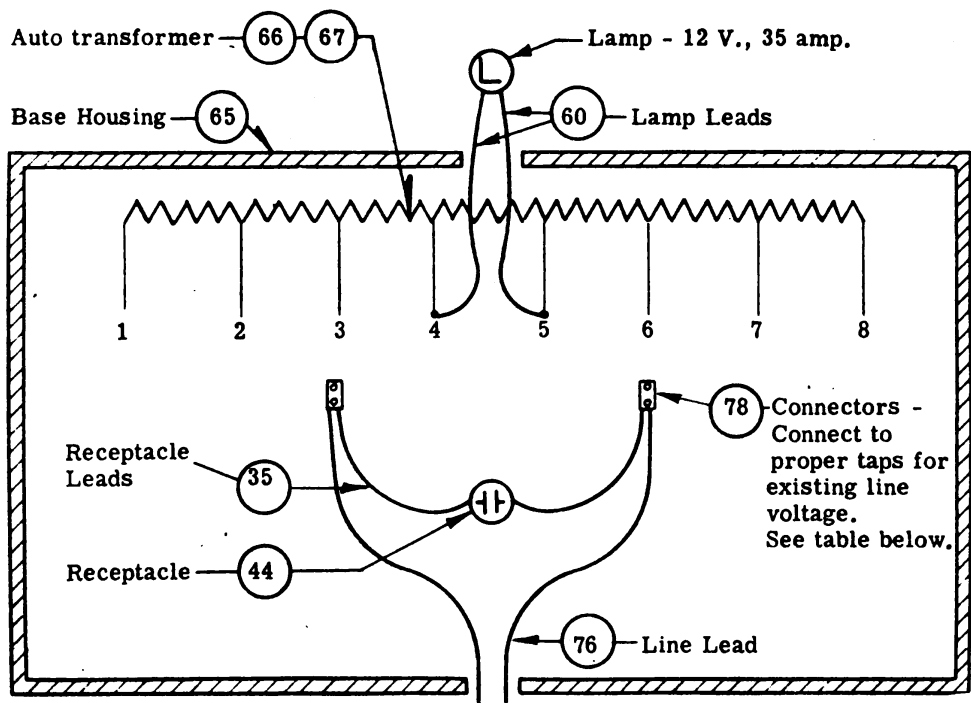


Fig. 4—Ceiling Light Projectors ML-121-C, E, F and G, Transformer and Mounting Case Assembly, Side Section View.



NOTE: Item numbers refer to corresponding items in figure 2.

To Line ,
90-120 volt

Line Voltage	Use Primary Taps
90	3-6
95	2-6
100	3-8
105	2-8
110	1-6
115	1-7
120	1-8

Fig. 5—Ceiling Light Projectors ML-121-A and B, Wiring Diagram

NOTE: Socket assembly in Ceiling Light Projectors ML-121-A, B, C, E, and F differs in construction from that of Ceiling Light Projector ML-121-G.

6. Supporting Base

The base of the projector is a single casting for both the transformer housing and slip-fitter. A gasketed weatherproof cover is provided for the transformer housing. The slip-fitter fits over 4-inch pipe with sufficient "play" to permit leveling of the drum by adjusting the set screws in the slip-fitter. Access to the transformer housing is gained by removing the cover plate on one side of the housing.

7. Transformer

The transformer is rated at 450 volt-amperes, 90/120-volt primary, 12-volt secondary. Primary taps are provided for supply voltages of 90, 95, 100, 105, 110, 115, or 120 volts in order to obtain the rated secondary voltage under a wide range of primary voltage. A standard receptacle is mounted in the transformer housing and connected in parallel with the movable primary terminals to facilitate measurement of the line voltage.

NOTE: Single-winding autotransformers are provided in Ceiling Light Projectors ML-121-A and B. Two-winding transformers, connected to a terminal block, are provided in Ceiling Light Projectors ML-121-C, E, F and G.

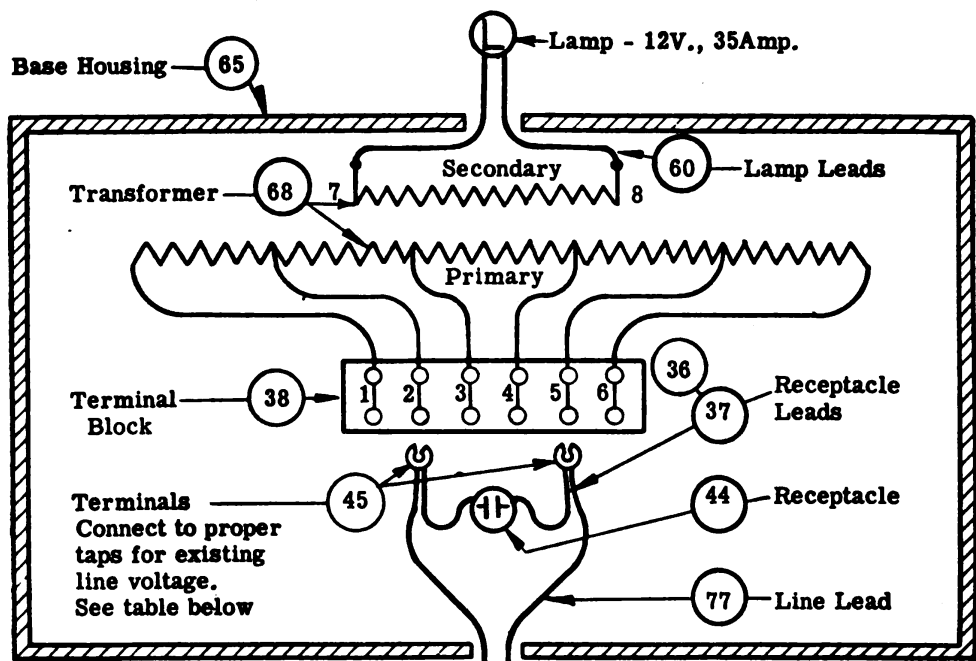
SECTION II

INSTALLATION AND OPERATION

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8. Initial Procedure

Don't remove the projector from its packing case until the pipe standard on which it is to be mounted is installed. To unpack the projector, open the side of the crate or box adjacent to the top or cover glass, being careful not to strike the cover glass with the tools. Then remove the blocks or wedges holding the projector in place and lift it out. If the unpacking is done at a distance from the installation site, lay the projector on its side and avoid rough handling when hauling it to its destination. **CAUTION: TAKE CARE NOT TO SCRATCH THE COVER GLASS BY LAYING TOOLS OR OTHER METAL OBJECTS ON IT.**



NOTE: Item numbers refer to corresponding items in figure 3 or 4.

Line Voltage	Use Primary Taps
90	3-4
95	2-4
100	3-5
105	2-5
110	2-6
115	1-5
120	1-6

Fig. 6—Ceiling Light Projectors ML-121-C, E, F and G, Wiring Diagram

9. Installation

a. Mounting

- (1) After unpacking, loosen the eight set screws in the slip-fitter and set the projector on the 4-inch vertical pipe stand-ard provided for this purpose.
- (2) Place the small spirit level, furnished with the projector, on one of the leveling perches attached to the drum. Where there is no perch attached, (as in Ceiling Light Projectors ML-121-A and ML-121-B) simply place level on cover glass. There are four set screws (two on each side of the slip-fitter) which adjust the projector position in the direction indicated by the level.
- (3) Lightly tighten the lower set screw on each side of the slip-fitter, adjusting first one and then the other to level the drum in that direction.
- (4) Now lightly tighten the upper set screws on the same sides of the slip-fitter.
- (5) Place the level on the other perch.
- (6) Repeat the procedure, leveling the drum in the opposite direction.
- (7) Now, tighten all the set screws gradually, in the meantime checking the level on both perches to be sure the position of the bubble remains the same.
- (8) After all the set screws are tight, tighten the locknuts provided on four of the screws. These locknuts are not provided on Ceiling Light Projectors ML-121-A and B.

b. Wiring

Connect the two-wire supply line from the control switch to the cable extending through the bushing on the back of the transformer housing.

10. Preparation for Use

a. Remove the cover plate of the transformer housing and connect the two movable terminals (item 45) to taps No. 1 and No. 6 on the terminal block.

NOTE: In Ceiling Light Projectors ML-121-A and B, connect the two connectors (item 78) directly to transformer taps No. 1 and No. 8.

b. Install a lamp in the projector socket. (See paragraph 17).

c. Close the switch connecting the projector to its power supply.
THE TWO MOVABLE TERMINALS OR CONNECTORS ARE

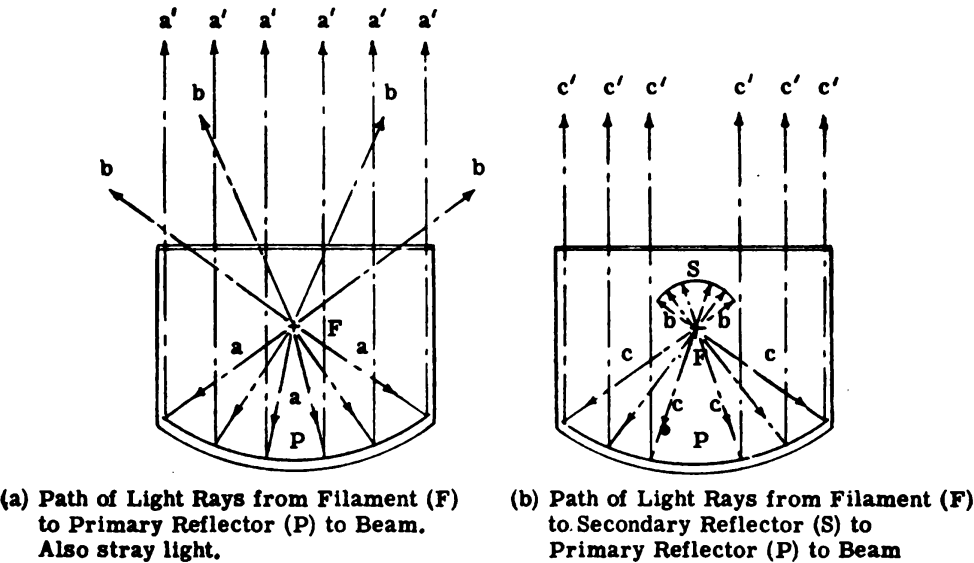


Fig. 7—Diagram of Optical System

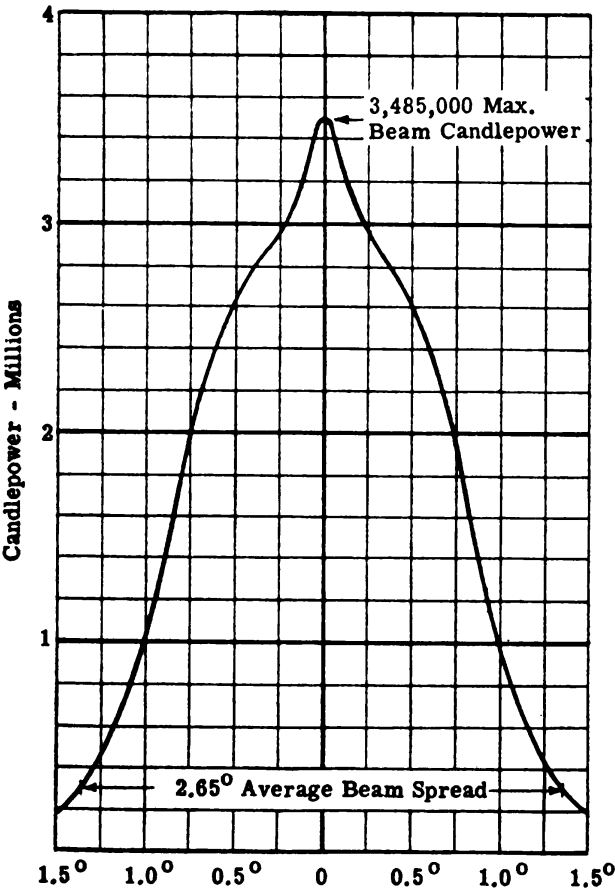


Fig. 8—Average Candlepower Distribution Curve

NOW AT THE LINE VOLTAGE. TREAT THEM AS SUCH! BE CAREFUL!

d. Measure the line voltage with an a-c voltmeter, 0-150 volt range, by plugging the voltmeter leads into the receptacle (item 44).

NOTE: When checking line voltage at the primary, operating conditions should be reproduced. For example: If installation is on an airport where beacon and boundary lights are ordinarily in operation when the ceiling light projector is operated, these lights should be turned on when measuring the line voltage.

e. From the table in figure 5 or figure 6, determine the proper taps for the measured line voltage and connect the terminals or connectors to those taps.

f. Again, measure the voltage and consult the table in figure 5 or figure 6 to determine if the taps in use are still correct. **NEVER SELECT A VOLTAGE TAP WHICH IS FOR A RATING LOWER THAN THE MEASURED LINE VOLTAGE. ALWAYS CHOOSE A VOLTAGE EQUAL TO, OR NEXT HIGHER THAN THAT OF THE LINE.** Otherwise, the lamp voltage will exceed 12 volts, resulting in reduced lamp life. For instance, if the line voltage reads 112 with the lamp lighted, connect the terminal clips to the 115-volt tap, instead of the 110-volt tap.

g. Tape the four unused transformer leads and the two connectors on Ceiling Light Projectors ML-121-A and ML-121-B by:

- (1) Bending back the bare wire of each unused lead so that it is pressed against the insulation of the wire.
- (2) Then, wrap each lead and connector carefully with rubber tape and cover with friction tape.

NOTE: BE SURE that no part of the wire or connector itself is exposed.

h. Replace the transformer housing cover and tighten the four screws which hold it in place.

11. Operation

Turn on the switch in the supply line to the projector. If the lamp is in operating order, the illuminated spot produced by the beam on the clouds will be visible and measurements of ceiling height may be made by the instrument available for that purpose.

12. Precautions During Operation

a. Check the line voltage at the projector occasionally, using an a-c voltmeter to insure proper operating conditions, particularly if the lamps burn out prematurely. The rated life of the lamp is 100

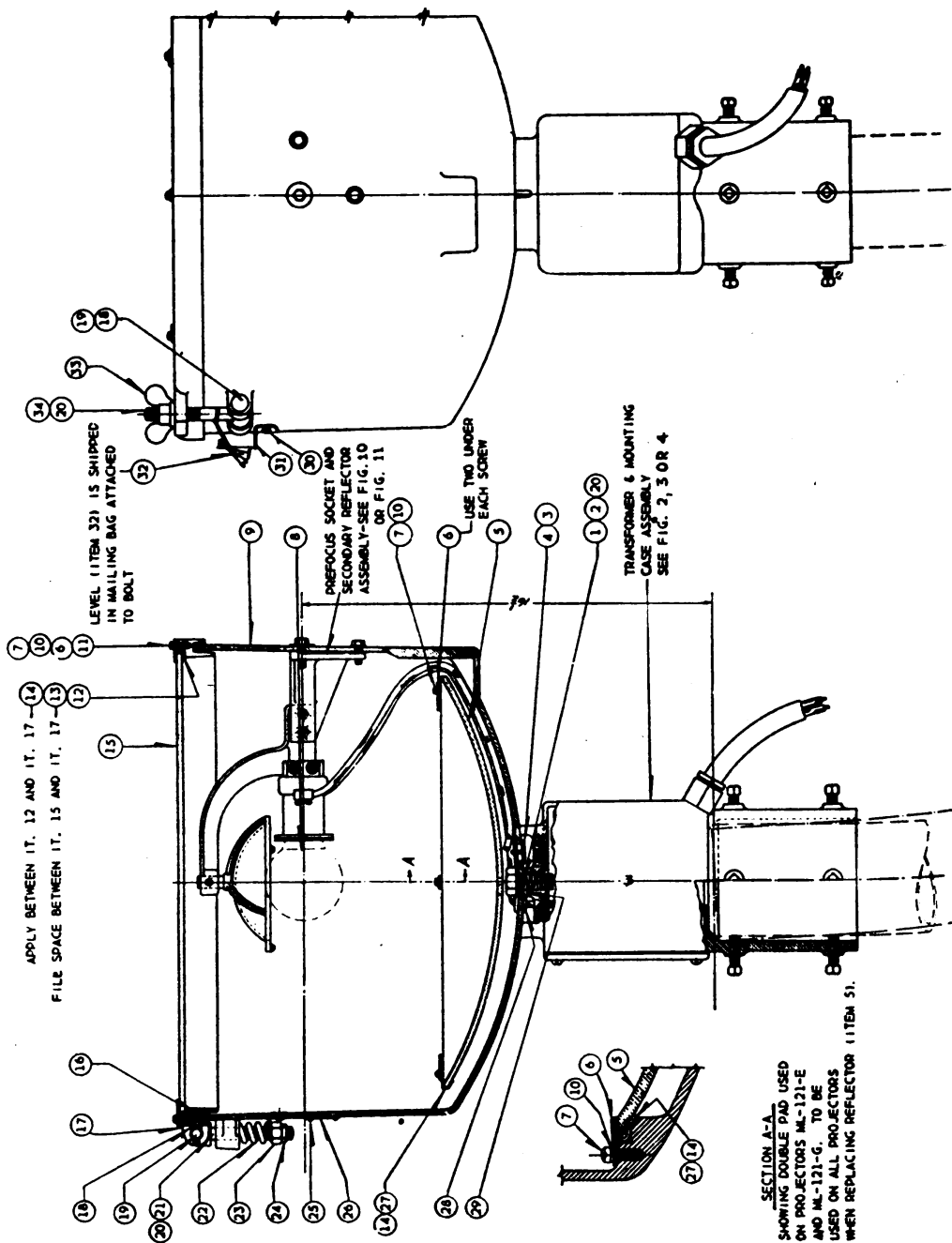


Fig. 9—Ceiling Light Projector ML-121-(*), General Assembly

hours of continuous burning. When the lamp is used intermittently, its life may be decreased by half. Although the **average** life is 100 hours, individual lamps may vary considerably. Therefore, **a lamp failure in less than approximately 100 hours of total service can be considered as premature failure.** Such a failure ordinarily indicates that the lamp has been operated at too high a voltage.

b. Line voltage variations may be of two types:

- (1) Erratic short period fluctuations due to changes in load on the electrical supply system.
- (2) Permanent or semi-permanent changes due to "installation changes" in the electrical supply system. For example, plugging in some other electrical device in the same power line might be such an "installation change."

c. Reconnect the transformer taps (as outlined in paragraph 10) to accommodate the type of change mentioned in 12*b.* (2). In cases of erratic variations covering a wide voltage range, study these variations for several nights and tap the transformer for the highest voltage noted.

SECTION III

FUNCTIONING OF PARTS

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13. Theory of Optical System	

a. Function of Primary Reflector

Figure 7a shows the arrangement of the primary reflector (P) and the lamp filament (F) with the lamp filament at the **focal point** of the reflector. One of the basic principles of reflection may be stated as follows:

- (1) When a source of light having negligible dimensions is located at the focal point of a true parabolic reflector, every ray of light (a) reaching the reflector will be reflected in a direction parallel to the line through the filament and the center of the reflector, resulting in rays (a').
- (2) The effect of the beam from a comparatively large light source is to cause a divergence (branching out) of the rays (a') from parallel, the divergence increasing with the size of the filament. For this reason the ceiling projector is designed for use with a lamp having a small filament, producing a **narrow beam of high candlepower.**

b. Function of Secondary Reflector

The light rays (b) in figure 7a, going directly through the projector cover glass amount to a considerable percentage of the total

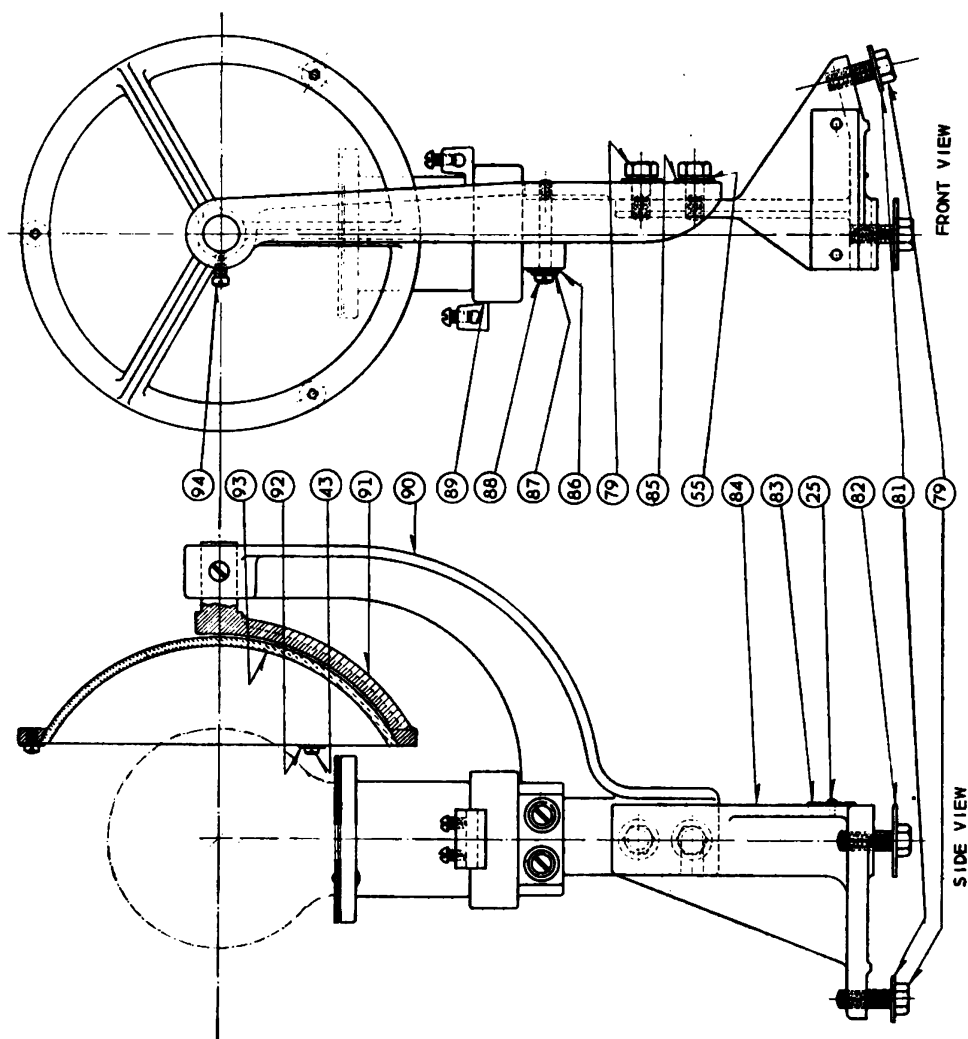


Fig. 10—Ceiling Light Projectors ML-121-A, B, C, E and F, Prefocus Socket and Secondary Reflector Assembly

lamp output, but due to their wide dispersion (spreading) add practically nothing to the main beam. In figure 7b, the secondary reflector (S) is spherical in contour and intercepts all the rays (b) from the filament, reflects them back through the filament to the primary reflector (P) as rays (c), where they are again reflected as rays (c'). These rays are all parallel and therefore add to the rays (a') in figure 7a. An increase of 35 percent in beam candlepower is obtained by the use of a secondary reflector.

SECTION IV

MAINTENANCE

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14. Opening and Closing Door

To open the projector door, loosen the two wing nuts which hold the door frame against the edge of the drum and pull open. The door may be swung back on its hinges as far as it will go and allowed to rest there. After reclosing the door, securely tighten the two wing nuts at the same time to avoid distorting the door frame. DO NOT USE TOOLS OR LEVERS TO TIGHTEN THE NUTS, AS THE NORMAL STRENGTH OF THE HANDS IS SUFFICIENT TO MAKE THE GASKETED JOINT DUST-TIGHT AND WEATHERPROOF.

15. Cleaning

Clean the two reflectors, the lamp, and both sides of the cover glass before placing them in service and regularly thereafter with "Bon Ami" (or equal), using very little water. Remove the lamp from its socket to clean the secondary reflector. (See paragraph 17). Clean the lamp after it has been replaced in the socket in order to remove all finger marks from the bulb.

16. Replacing Cover Glass (Lens)

a. To replace the cover glass, first open the projector door (paragraph 14) until the spring tension is released from the hinges and remove the cotter pins and hinge pins in the two hinges. Remove the door assembly and place it face up on a flat surface such as a box or

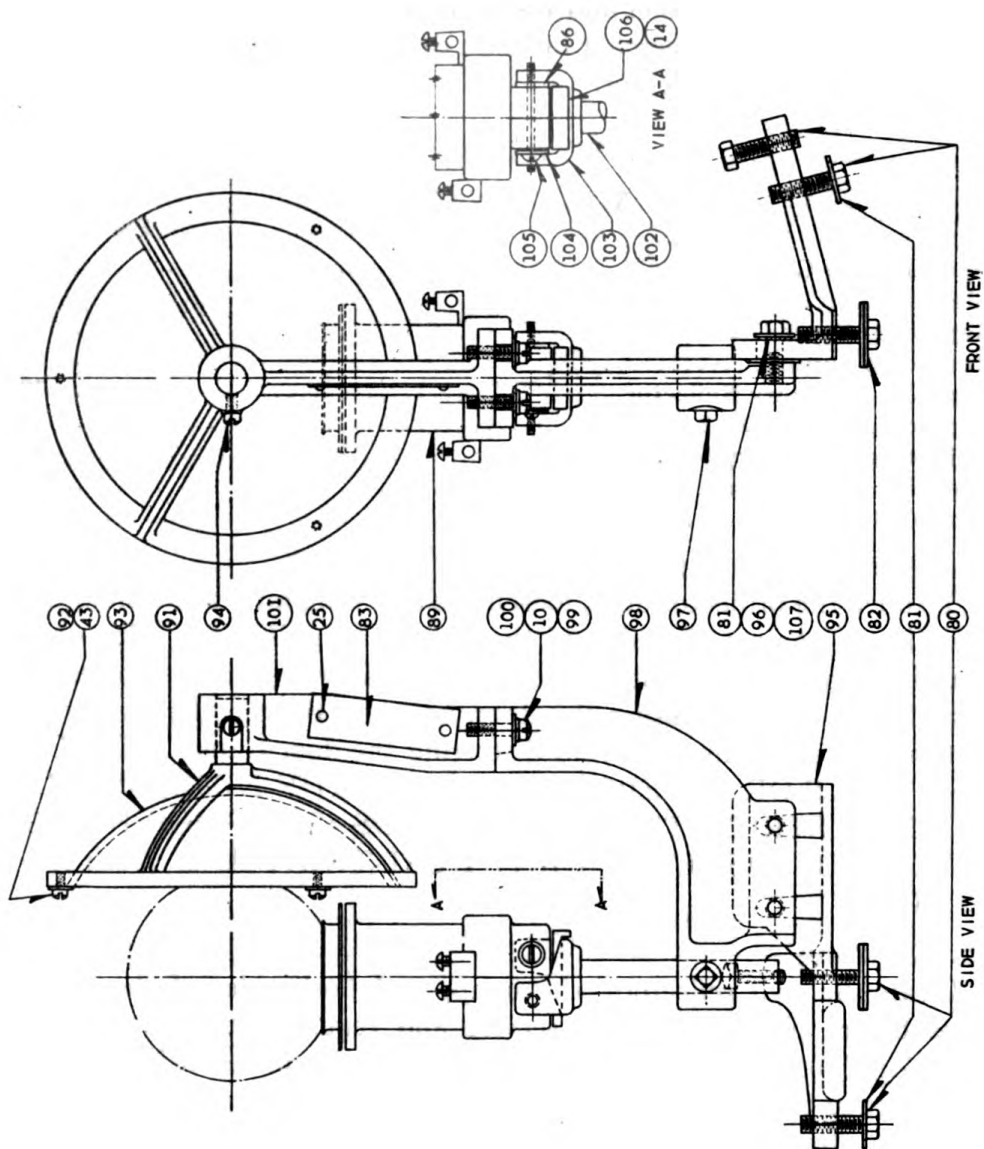


Fig. 11—Ceiling Light Projector ML-121-G, Prefocus Socket and Secondary Reflector Assembly

work bench. The new cover glass assembly includes all the cork pads (item 12), sealing compound (item 13) and cork pad cement (item 14) **necessary** for installing the cover glass (item 15).

- (1) Remove the screws, clips and clip pads which hold the glass in place and remove the damaged glass.
- (2) Scrape the old sealing compound and cork pads out of the door frame.
- (3) Apply a dab of cement to 10 points on the seating flange of the door frame, one opposite each of the holes for the clip holding screws. Press a cork pad into place on the cement and allow to dry.
- (4) Knead a handful of sealing compound until uniform in texture, form into a rope about $\frac{1}{4}$ " in diameter and lay it on the seating flange of the door frame. Press lightly into place.
- (5) Lay the new cover glass on the ring of compound and press it down firmly and evenly until the glass seats on the cork pads. The compound should now have squeezed out all around, filling the space between the glass and the door frame.
- (6) Replace the screws, clips and clip pads which hold the cover glass in place. Tighten the screws evenly all around the circle to produce uniform pressure on the glass.
- (7) Scrape the excess compound from both sides of the door frame, and smooth the surface.
- (8) Clean both sides of the cover glass. (See paragraph 15). Oil stains from the compound may be removed with a cloth moistened with gasoline or benzine.
- (9) Replace the door assembly on the projector by reversing the procedure outlined at the beginning of this paragraph.

17. Replacing Lamp

Replace the lamp when the bulb begins to turn black or when **burned out.** To remove it from the socket, first **LET THE LAMP COOL. THEN, PRESS THE LAMP DOWN WITH THE FLESHY PART OF THE HAND AND GRASP IT BETWEEN THE THUMB AND FINGERS.** While pressing against the socket, give the lamp a quarter turn to the left and remove it from the socket. **Hold the new lamp in the same manner and place its base in the socket, giving it a quarter turn to the right.** The prefocus construction of the lamp arranges the filament in the correct focal position **without making adjustments.** When replacing lamps, take care not to **push** against the secondary reflector holder, as it may be bent out of position.

18. Replacing Primary Reflector

(Figure 9). A primary reflector (item 5) is replaced by removing the six sets of screws, lockwashers, and clips which hold it in place against the felt-pads (item 27).

a. Remove the old reflector. Since the felt pads are cemented to the bosses on the bottom of the drum, they will ordinarily remain in place and in usable condition. If the old reflector is not broken, it should be returned to the 5th Echelon Depot for resilvering.

b. Place the new reflector on the pads in the position occupied by the old reflector. There is sufficient space in the drum to clear the reflector without removing the socket and secondary reflector assembly.

c. Replace the six sets of screws, lockwashers and clips and BE CAREFUL TO TURN THE END OF THE FELT PAD OVER THE EDGE OF THE REFLECTOR, BETWEEN THE CLIP AND THE REFLECTOR SURFACE. See the detail sketch (Section A-A) in figure 9.

d. Tighten the screws gradually and evenly to prevent strain on the reflector. The position of the new reflector will be sufficiently near that of the original to make refocusing of the lamp unnecessary.

19. Replacing Secondary Reflector

(Figures 10 and 11). A secondary reflector (item 93) is replaced by:




a. Removing the three screws and washers which hold the reflector in place. If one of the screws should be in front of the lamp socket and inaccessible, loosen the screw shown in the illustration as item 94 and rotate the reflector holder slightly.

b. Place the new reflector in the holder and replace the three holding screws and washers.

c. Check the adjustment of the secondary reflector (paragraph 20).

20. Adjusting Secondary Reflector

When a secondary reflector has been replaced (as described in paragraph 19), it is possible that the original position may not have been duplicated. Check the adjustment and correct if necessary.

a. In the daytime, WITH THE LAMP OFF, look directly into the primary reflector near the edge and observe the two images of the lamp filament. The one thrown directly on the reflector will appear as two nearly parallel elements of the filament, thus . The image from the secondary reflector will be inverted, thus . The correct reflector adjustment is indicated when the two images are the same size and "interlocked", thus .

b. If the two images are not "interlocked" loosen the screw (shown in figures 10 and 11 as item 94) and **gradually** rotate the reflector holder on its shaft, observing the movement of the secondary image at the same time. Since the reflector holder is slightly eccentric, at some point in its rotation the secondary image will be seen interlocked with the primary image, indicating the correct adjustment.

c. If the two images are not the same height (although they may be interlocked as described) move the secondary reflector holder slightly in or out on its shaft until the inverted secondary image reaches the same size as the upright primary image.

d. Tighten the reflector holder screw after the adjustments described in *b* and *c* preceding, have been made.

21. Focusing Instructions

a. If (to a trained observer) it is evident that the lamp is out of focus, proceed as follows:

- (1) In focusing the unit, be sure to focus the lamp with respect to both the auxiliary and the main reflector. First focus the lamp for the auxiliary reflector, and then focus the complete assembly for the main reflector.
- (2) Focusing the auxiliary reflector is best done by eye. Use either a pair of welder's goggles, or arrange the unit so that the voltage on the lamp terminals can be reduced to the point where the observer can look directly at the filament without discomfort.
- (3) For most convenient focusing of this unit, it is recommended that the complete lamp assembly be removed from its housing.
- (4) To look through the lamp bulb, towards the auxiliary reflector, loosen the screw (item 94) shown in figures 10 and 11, and gradually rotate the reflector-holder on its shaft, observing, at the same time, the filament image. Since the reflector-holder is made slightly eccentric, at some point in the rotation, the filament image should be seen super-imposed upon the filament itself in such a manner that the reflected image of the coils comes halfway between the coils of the filament itself. If necessary move the secondary reflector-holder in or out on its shaft in order to effect the proper adjustment.
- (5) Tighten the reflector-holder screw after making these adjustments. Replace the lamp assembly in its housing.
- (6) In order to focus the assembly of the auxiliary reflector and the lamp for the main reflector, first level the housing so that

the axis through the focal point of the main reflector is horizontal. Now, manipulate the assembly until the most intense beam of light with the narrowest beam spread is obtained. It is recommended that the beam be projected on an object approximately 200 feet away and that a target be set up at the same height above the mounting level as the center of the reflector.

- (7) Remember if the source of light is moved "in," past the focal point (too close to the mirror) the beam will diverge widely, or spread. If moved in the opposite direction (too far away from the mirror) the beam will converge to some point in front of the mirror and then diverge or cross over. If the source is off to one side of the focal point, the beam will be directed to the opposite side.

22. Trouble Hunting

Failure of the projector to operate will ordinarily be caused by a lamp burnout. It may also be caused by a defect in the power supply circuit to the projector. This can be determined by testing the line at the projector with a test lamp or a voltmeter, plugged into the receptacle provided in the transformer housing. If both the lamp and the supply line are intact, examine the six transformer leads connected to the terminal block (figure 3, item 38) for broken conductors or loose connections. Also, examine the secondary leads (figure 4, item 60) including the connections at the lamp socket. If this procedure does not locate the trouble, it is probable that the transformer has failed and requires replacement.

SECTION V
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23. Table of Replaceable Parts.—a. Ceiling Light Projector ML-121-(*), Drum Assembly

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
1	1	* 6L71010-1	ALL	WASHER, lock— $\frac{5}{8}$ " steel cad. plated	Lock bolt	SH	.....
2	1	* 6L610-1.5HC	ALL	BOLT— $\frac{5}{8}$ "—11 x $1\frac{1}{2}$ " hex hd steel cad. plated	Hold drum on base	SH	.....
3	1	*	A,B,C,E,F	PLUG, drain—S*343689, bronze cad. plated (Special)	Drain moisture	W	766509
3	1	*	G	PLUG, drain—S*343689A, steel electro galv (Special)	Drain moisture	W	766509
4	1	*	ALL	SCREEN, drain—30 mesh .009 brass 1" x 1" cad. plated	Exclude dirt, insects	W	Spec. 3046
5	1	* 7A481A-1/2	ALL	REFLECTOR, primary—S*891281 parabolic mirrored glass $16\frac{3}{4}$ " dia. with $\frac{1}{4}$ " center hole (Special—Procure by Contractors' identification)	Produce light beam	BL LL	766565
6	22	*	A,B,C,E,F	CLIP—S*349315A, bronze cad. plated (Special)	Clamp cover glass or refl.	W	769-2320
6	22	* 7A481A-1/11	G	CLIP—S*349315B, steel cad. plated (Special)	Clamp cover glass or refl.	W	769-2320
7	16	* 6L7032-6.3S	ALL	SCREW, machine—#10-32 x $\frac{3}{8}$ " fil hd steel cad. plated	Fasten clip	SH	.....
8	2 (in box)	* 7A481/2	ALL	LAMP—420 watt, 12 volt, G-25 bulb, airplane headlight, mogul prefocus base	Light source	W	.....

9	1	*	A, B (#1- #144)	DRUM—Cast aluminum (Special)	Hold all parts	W	678485, it. 4
9	1	*	B (#145- #216), C, E, F, G.	DRUM—Cast iron with red oxide primer, baked black enamel inside, 3 coats gray air dried outside (Special)	Hold all parts	W	678485, it. 5
10	16	* 6L72210	A, B, C, E, F	WASHER, lock—#10 steel cad. plated	Lock screw	SH	.....
10	18	* 6L72210	G	WASHER, lock—#10 steel cad. plated	Lock screw	SH	.....
11	10		ALL	PAD, cover glass clip—S#347715—1" x $\frac{1}{2}$ " x $\frac{1}{16}$ " tk asbs sheet pierced for Ref. No. 7	Cushion cover glass	W	769-2320
12	10		ALL	PAD, cover glass— $\frac{5}{16}$ " x $\frac{1}{2}$ " x $\frac{3}{8}$ " tk cork sheet	Cushion cover glass	W	Spec. 3180
13	1 lb.	7A481A- 1/7	ALL	COMPOUND—Plastic, non-hardening— "Duxseal" No. 4951	Seal cover glass	JM	.....
14	1 oz.		ALL	CEMENT—No. 1 "Form-a-gasket"	Fasten Pad	PC	.....
15	1		ALL	COVER GLASS—S#891280—"Herculite" plate 18 $\frac{3}{16}$ " dia. x $\frac{1}{4}$ " tk (Special— Procure by Contractor's identification)	Close drum	PP	678401
16	1	* 7A481A- 1/17	ALL	GASKET, cover—59 $\frac{1}{2}$ " of $\frac{1}{16}$ " x $\frac{3}{8}$ " graph- ited asbestos packing No. 1141	Seal cover frame	C	.....
17	1	*	A, B (#1- #144)	BEZEL—Cast aluminum (Special)	Hold cover glass	W	678357, it. 1

23. Table of Replaceable Parts.—a. Ceiling Light Projector ML-121-(*), Drum Assembly—Cont'd

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
17	1	#	B(#145-#216)C, E,F,G	BEZEL—Cast iron, finish same as cast iron drum Ref. No. 9 (Special)	Hold cover glass	W	678357,it.2
18	4	# 6L974-8-56P	ALL	PIN, cotter— $\frac{1}{8}$ " x $\frac{3}{4}$ " steel cad. plated	Fasten hinge pin	SH	.....
19	4	# 7A481-1/21	ALL	PIN, hinge—S#349007, cast iron hot galvanized (Special)	Hold eye bolt	W	609807
20	..	#	ALL	PETROLATUM—Petroleum jelly	Lubrication	CP	.....
21	2	# 6L308-4.1C	A,B	BOLT, eye—S#349318, cast bronze cad. plated (Special)	Hinge bezel	W	769-2545
21	2	#	C,E,F,G	BOLT, eye—cast iron hot galvanized (Special)	Hinge bezel	W	769-2545,it.4
22	2	# 7A481A-1/22	ALL	SPRING—S#349796A, steel cad, plated, lacquered (Special—Procure by Contractor's identification)	Tension on hinge	CW	865379
23	2	# 5B6908-13-13	ALL	NUT, lock— $\frac{1}{2}$ " hex steel cad. plated	Adjust hinge	SH	.....
24	2	# 6L3508-13.16C	ALL	PALNUT—S#336940A, $\frac{1}{2}$ "— $\frac{1}{2}$ "—13 steel cad. plated and lacquered (Special—Procure by Contractor's identification)	Lock nut	P	865281
25	6	#	ALL	SCREW, drive—#2 x $\frac{1}{4}$ " rd hd steel cad. plated	Fasten plate	SH	.....

26	1	#	ALL	PLATE, name—(Special)	Identification	W	.....
27	6	# 7A481A- 1/20	A,B,C,F	PAD, reflector—1" x 1/2" x 1/8" tk soft felt	Cushion reflector	CP	.....
27	12	# 7A481- 1/20	E,G	PAD, reflector—1" x 1/2" x 1/8" tk soft felt	Cushion reflector	CP	.....
28	2	# 7A481A- 1/15	ALL	BUSHING, cable—S#311552A—rubber (Special—Procure by Contractor's identi- fication)	Protect cable	MR	876477
29	2	# 6L35016	E,F,G	WASHER, asbestos mill board—S#337402 5/8" ID x 1 1/8" OD x 1/8" tk	Protect bolt threads	W	.....
30	4	#	B(#145- #216)C, E,F,G	SCREW, machine—#10—32 x 1/4" fil hd steel cad. plated	Fasten perch	SH	.....
31	2	#	C,E,F,G	PERCH, leveling—steel electro galv (Special)	Support level	W	865648,it.3
32	1	# 6Q63141	ALL	LEVEL—No. 38 1/2, 4-inch	Level drum	S	.....
33	2	#	A,B	NUT, wing—S#349112, cast bronze cad. plated, 1/2"—13 threads (Special)	Fasten cover	W	769-2360
33	2	# 6L3808- 13-38	C,E,F,G	NUT, wing—S#1218427, cast iron cad. plated, 1/2"—13 threads (Special)	Fasten cover	W	769-2360
34	2	#	A,B	BOLT, eye—S#349313, cast bronze ca.j. plated (Special)	Fasten cover	W	769-2444
34	2	# 6L308-4	C,E,F,G	BOLT, eye—S#1218495, cast iron cad. plated (Special)	Fasten cover	W	769-2444

23. Table of Replaceable Parts.—b. Ceiling Light Projector ML-121-(*), Base Assembly

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
35	2	*	A,B	LEAD, receptacle—8" of 26—.010" (#16) stranded 300 volt rubber ins. wire .20" dia.	Connect receptacle	W	Spec. 7420-7
36	1	* 1B4018.2	C,E,F,G	LEAD, receptacle—8" of 16—.010" (#18) stranded 300 volt N.E.C. Type RH wire, .15" dia.	Connect receptacle	W	Spec. 7420-20
37	1	*	C,E,F,G	LEAD, receptacle—6" same as Ref. No. 36	Connect receptacle	W	Spec. 7420-20
38	1	*	C,E,F,G	BLOCK, terminal—S# 1218008, Micarta 6-point (Special)	End leads	W	866456
39	1	*	C,E,F,G	INSULATION—1½" x 4½" x .035" tk treated paper	Insulate from ground	W	Spec. 980
40	..	*	ALL	COMPOUND—R.P. No. 417 trans. sealing	Fasten insulation	HHR	.....
41	1	*	ALL	BRACKET—steel electro galv (Special)	Hold receptacle	W	866414, it. 1
42	2	* 6L6440-4.6A	A,B	SCREW, machine—#4-40 x ¼" rd hd steel cad. plated	Fasten receptacle	SH	.....
43	3	* 6L6632-4.15FE	A,B	SCREW, machine—#6-32 x ¼" fil hd steel cad. plated	Fasten secondary reflector	SH	.....

43	5	# 6L6632-4.15FE	C,E,F,G	SCREW, machine—#6-32 x 1/4" fl hd steel cad. plated	Fasten receptacle and sec. refl.	SH	.....
44	1	# 7A481A-1/5	ALL	RECEPTACLE—Cat. No. 4412—drill strap holes 5/8" (#22) when installing	Receptacle for volt-meter leads	B	.....
45	2	# 3Z12053	C,E,F,G	TERMINAL—No. 24 single ear copper, 3/8" hole	Connect lead to term. block	HBS	.....
46	4	# 6L6832-8.1P	C,E,F	SCREW, machine—#8-32 x 1/2" rd hd steel cad. plated	Fasten term. block	SH	.....
46	2	# 6L6832-8.1P	G	SCREW, machine—#8-32 x 1/2" rd hd steel cad. plated	Fasten term. block	SH	.....
47	1	# 7A481A-1/12	A	COVER—cast iron, hot galv (Special)	Close housing	W	679292,it.2
48	1	# 7A481B/2	B,C,E,F,G	COVER—cast iron, hot galvanized (Special)	Close housing	W	675544,it.2
49	1	# 7A481A-1/18	ALL	GASKET, cover—S#344047 cork (Special)	Seal cover	W	475201
50	4	# 6L7920-4-28.1S	A	SCREW, machine—1/4"—20 x 1 3/4" rd hd steel cad. plated	Fasten cover	SH	.....
51	4	# 6L7920-4-14.1S	B,C,E,F,G	SCREW, machine—1/4"—20 x 7/8" rd hd steel cad. plated	Fasten cover	SH	.....
52	2	# 6L7920-4-64.12S	A	SCREW, machine—1/4"—20 x 4" fl hd steel cad. plated	Fasten autotrans.	SH	.....
53	2	# 6L7920-4-48.3S	B	SCREW, machine—1/4"—20 x 3" fl hd steel cad. plated	Fasten autotrans.	SH	.....

23. Table of Replaceable Parts.—b. Ceiling Light Projector ML-121-(*), Base Assembly—Cont'd

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
54	2	# 6L7920-4-60.12S	C,E,F,G	SCREW, machine— $\frac{1}{4}$ "—20 x $3\frac{3}{4}$ " fil hd steel cad. plated	Fasten trans.	SH	.....
55	4	# 6L71114	A,B,C,E,F	WASHER, lock— $\frac{1}{4}$ " steel cad. plated	Lock screw	SH	.....
55	2	# 6L71114	G	WASHER, lock— $\frac{1}{4}$ " steel cad. plated	Lock screw	SH	.....
56	1	#	C,E,F	BRACKET—steel electro galv (Special)	Hold term. block	W	866414,it.2
56	1	#	G	BRACKET—steel electro galv (Special)	Hold term. block	W	866594,it.1
57	8	# 6L7966-16.95C	ALL	SCREW, set— $\frac{3}{8}$ " x 1" sq hd cup point steel cad. plated	Fasten slip fitter	SH	.....
58	4	# 6L3506-16C	C,E,F,G	NUT, lock— $\frac{3}{8}$ " hex steel cad. plated	Lock set screw	SH	.....
59	..	# 6N8594	ALL	TAPE, friction— $\frac{1}{2}$ " wide	Protect leads	CP	.....
60	2	#	E	LEAD, lamp—30" of 19—.0285" (#8) stranded 600 volt N.E.C. Type AVB wire .297" dia.	Connect lamp	W	Spec. 7419-1
60	2	# 1B3010.3	A,B,C,F,G	LEAD, lamp—30" of 65—.0126" (#10) stranded 600 volt N.E.C. Type AVA wire .309" dia.	Connect lamp	W	Spec. 7419-3
61	..	#	ALL	CEMENT, rubber—"Plastikon" No. 169	Seal lead	BFG	.....
62	1	#	ALL	INSULATION— $3\frac{3}{4}$ " x 5" x .035" tk treated paper	Insulate from ground	W	Spec. 980
63	..	#	ALL	SOLDER	Fasten conductors	CP	.....

64	2	* 7A481A-1/16	ALL	CONNECTOR, sleeve—S#361149 copper (Special)	Connect lead to trans.	W	801901
65	1	*	ALL	HOUSING, base—cast iron hot galvanized (Special)	Support drum	W	679292, it. 1
66	1	* 7A481A-1/9	A	AUTOTRANSFORMER—S#890658-A—450 v-amp, 25 cycle, 90-120 volt primary, 12 volt secondary (Special)	Reduce line voltage	W	769488
67	1	* 7A481/T2	B	AUTOTRANSFORMER—S#344176—450 v-amp, 60 cycle, 90-120 volt primary, 12 volt secondary (Special)	Reduce line voltage	W	675463
68	1	7A481D/7	C, E, F, G	TRANSFORMER—S#342248—450 v-amp, 60 cycle, 90-120 volt primary, 12 volt secondary (Special)	Reduce line voltage	W	675463
69	5	*	A, B	WASHER, rubber—S#338324, $\frac{9}{16}$ " ID x $\frac{7}{8}$ " OD x $\frac{1}{8}$ " tk	Seal lead	W	865039
70	1	* 7A481A-1/19	C, E, F, G	PACKING—18" of $\frac{1}{8}$ " dia. graphited asbs packing No. 117	Seal lead	GP	.....
71	1	*	A, B	WASHER, flat—S#338323 brass, $\frac{41}{64}$ " ID x $\frac{23}{32}$ " OD x .063" tk	Seat for bushing cap	W	865022
72	1	*	A, B	BUSHING body—S#343685— $\frac{3}{4}$ "—14 tapered threads— $\frac{41}{64}$ " dia. bore, brass cad. plated (Special)	Protect lead	W	766509
73	1	*	C, E, F	BUSHING body—S#1217694— $\frac{3}{4}$ "—14 tapered threads— $\frac{41}{64}$ " dia. bore, steel cad. plated (Special)	Protect lead	W	476301

23. Table of Replaceable Parts.—b. Ceiling Light Projector ML-121-(*), Base Assembly—Cont'd

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
73	1	* 7A481A-1/10	G	BUSHING body—S# 1219403— $\frac{3}{4}$ "—14 tapered threads— $\frac{9}{16}$ " dia. bore, steel cad. plated (Special)	Protect lead	W	476301
74	1	*	A,B	BUSHING cap—S# 343686— $\frac{11}{16}$ " dia. bore, brass cad. plated (Special)	Compress washers	W	766509
75	1	*	C,E,F	BUSHING cap—S# 1217695 $\frac{11}{16}$ " dia. bore, steel cad. plated (Special)	Compress packing	W	476301
75	1	* 7A481A-1/14	G	BUSHING cap—S# 1217693 $\frac{9}{16}$ " dia. bore, steel cad. plated (Special)	Compress packing	W	476301
76	1	*	A,B(*1-#144)	LEAD, line—48" of 41—010" (#14) stranded 300 v 2 cond. cable v.c. and asb. ins., rubber jacketed .53" dia.	Connect to source	W	Spec. 7415-3
76	1	*	B(#145-#216)	LEAD, line—48" of 65—010" (#12) stranded 600 v 2 cond. cable V.C. and asb. ins. MRFR braid cover, .50" dia.	Connect to source	W	Spec. 7418-17
77	1	*	C	LEAD, line—55" of 65—010" (#12) stranded 600 v 2-cond. cable rubber ins. MRFR braid cover, .54" dia.	Connect to source	W	Spec. 7418-6
77	1	* 1B3012.1	E,F,G	LEAD, line—55" of 65—010" (#12) stranded 600 v 2-cond. cable V.C. and asb. ins. MRFR braid cover, .50" dia.	Connect to source	W	Spec. 7418-17
78	2	*	A,B	CONNECTOR—S# 30224A brass (Special) eccentric sleeve type, .180" ID x $\frac{5}{16}$ " OD x $\frac{3}{4}$ " long, with two #6-32 x $\frac{5}{16}$ " fl hd brass machine screws	Connect line to autotrans.	W	111915

23. Table of Replaceable Parts.—c. Ceiling Light Projector ML-121-(*), Socket and Secondary Reflector Assembly

79	5	* 6L604-6HC	A, B, C, E, F	BOLT— $\frac{1}{4}$ "—20 x $\frac{5}{8}$ " hex hd steel cad. plated	Hold parts	SH	.....
80	4	* 6L604-1HC	G	BOLT— $\frac{1}{4}$ "—20 x 1" hex hd steel cad. plated	Adjust assembly	SH	.....
81	2	* 6L58004-5	A, B, C, E, F	WASHER, wide— $\frac{1}{4}$ " steel cad. plated, $\frac{3}{4}$ " OD x $\frac{1}{8}$ " tk	Seat for bolt hd.	SH	.....
81	4	* 6L58004-5	G	WASHER, wide— $\frac{1}{4}$ " steel cad. plated, $\frac{3}{4}$ " OD x $\frac{1}{8}$ " tk	Seat for bolt hd. or lock washer	SH	.....
82	1	* 6L58004-6	A, B, C, E, F	WASHER, extra wide— $\frac{1}{4}$ " brass cad. plated, 1" OD x $\frac{1}{8}$ " tk	Seat for bolt hd.	SH	.....
82	2	* 6L58004-6	G	WASHER, extra wide— $\frac{1}{4}$ " steel cad. plated, 1" OD x $\frac{1}{8}$ " tk	Seat for bolt hd.	SH	.....
83	1	*	ALL	PLATE, instruction—N.P. No. 21347 (Special)	Warning	W	.....
84	1	*	A, B (#1-#144)	BASE, socket assembly—cast aluminum (Special)	Hold bracket	W	678358, it.1
84	1	*	B (#145-#216), C, E, F	BASE, socket assembly—cast iron, black enamel (Special)	Hold bracket	W	678358, it.7
85	2	* 6L60004	A, B, C, E, F	WASHER, flat— $\frac{1}{4}$ " steel cad. plated	Seat for lock washer	SH	.....

23. Table of Replaceable Parts—c. Ceiling Light Projector ML-121-(*), Socket and Secondary Reflector Assembly—Cont'd

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
86	2	*	ALL	WASHER, asbestos mill board—S#354268 3/8" ID x 1/2" OD x 3/8" tk	Cushion socket	W	.....
87	2	* 6L58008	A,B,C,E,F	WASHER, flat—#8 steel cad. plated	Seat for screw head	SH	.....
88	2	* 6L6832-24.12S	A,B,C,E,F	SCREW, machine—#8—32 x 1 1/2" fil hd steel cad. plated	Fasten socket	SH	.....
89	1	7A481A-1/6	ALL	SOCKET—S#346547A—250 v 35 amp mogul prefocus (Special) Note: Terminal screws are #8—32 x 3/8" rd hd	Hold lamp	W	766670
90	1	*	A,B(#1-#144)	BRACKET, secondary reflector—cast alum. (Special)	Hold spider	W	678358,it.2
90	1	*	B(#145-#216),C,E,F	BRACKET, secondary reflector—cast iron, baked enamel (Special)	Hold spider	W	678358,it.8
91	1	*	A,B(#1-#144)	SPIDER, secondary reflector—cast alum. (Special)	Hold reflector	W	678358,it.3
91	1	*	B(#145-#216),C,E,F,G	SPIDER, secondary reflector—cast iron, baked enamel (Special)	Hold reflector	W	678358,it.9
92	3	* 6L58006	ALL	WASHER, flat—#6 steel cad. plated	Seat for screw head	SH	.....
93	1	7A481A-1/4	ALL	REFLECTOR, secondary—S#341985A spherical mirrored glass 5" dia. (Special—Procure by Contractor's identification)	Intercept spill light	LL	475238 •

94	1	ALL	SCREW, machine—#8—32 x $\frac{3}{8}$ " fl hd steel cad. plated	Fasten spider	SH	.....
95	1	G	BASE, assembly—cast iron, baked enamel (Special)	Hold bracket	W	3B7426,it.1
96	2	G	BOLT— $\frac{1}{4}$ "—20 x $\frac{3}{4}$ " hex hd steel cad. plated	Fasten bracket	SH	.....
97	1	G	SCREW, set— $\frac{1}{4}$ "—20 x $\frac{3}{8}$ " sq hd cup point steel, cad. plated	Fasten socket stem	SH	.....
98	1	G	BRACKET—cast iron, baked enamel (Special)	Hold stem and spider arm	W	678750,it.5
99	2	G	SCREW, machine—#10—32 x $\frac{3}{4}$ " fl hd steel cad. plated	Fasten spider arm	SH	.....
100	2	G	WASHER, wide—#10 steel cad. plated	Seat for lock washer	SH	.....
101	1	G	ARM, spider—cast iron, baked enamel (Special)	Hold spider	W	3B7426,it.3
102	1	G	STEM, socket-steel cad. plated (Special)	Hold socket yoke	W	3B7426,it.2
103	1	G	YOKE, socket—cast iron, baked enamel (Special)	Hold socket	W	766496,it.19
104	2	G	WASHER, padded steel Cat. No. R-1605— $\frac{1}{2}$ for #8 screw	Cushion socket	LJB	.....

23. Table of Replaceable Parts.—c. Ceiling Light Projector ML-121-(*), Socket and Secondary Reflector Assembly—Cont'd

Ref. No.	Qty.	Signal Corps Stock No.	Used on Projector ML-121	Name of Part and Description	Function	Mfr. Code	Contractor's Dwg. or Spec. No.
105	2	*	G	SCREW, machine—# 8—32 x 1½" rd hd steel cad. plated	Fasten socket	SH	.....
106	1	*	G	SPACER, socket—L-shaped Micarta piece ⅛" thick x 1" wide x ¼" outside on short leg x 1⅞" outside on long leg	Prevent socket movement	W	.....
107	2	*	G	WASHER, lock—¼" steel Shakeproof with external teeth, cad. plated Stock No. 1114 Note: In some instances, restrictions on the use of cadmium made it necessary to electrogalvanize small hardware parts designated herein as cadmium plated.	Lock screw	SL	.....

24. Index of Manufacturers.

Abbreviation	Name and Address
B	Bryant Electric Co. Bridgeport, Connecticut
BFG	B. F. Goodrich Rubber Co. Akron, Ohio
BL	Bausch and Lomb Optical Co. Rochester, New York
C	Crandall Packing Co. Palmyra, New York
CP	Indicates standard commercial product
CW	Cleveland Wire Spring Co. 1281 E. 38 Street Cleveland, Ohio
GPC	Garlock Packing Co. Palmyra, New York
HBS	H. B. Sherman Mfg. Co. Battle Creek, Michigan
HHR	H. H. Robertson and Co. Farmers Bank Building Pittsburgh, Pa.
JM	Johns-Manville 22 E. 40th Street New York, New York
LJB	L. J. Barwood Mfg. Co. Everett Station, Mass.
LL	Lancaster Lens Co. Lancaster, Ohio
MR	Manhattan Rubber Co. Passaic, New Jersey
P	Palnut Mfg. Co. Irvington, New Jersey
PC	Permatex Co., Inc. Sheepshead Bay, N. Y.
PP	Pittsburgh Plate Glass Co. Pittsburgh, Pa.
S	The Stanley Works New Britain, Conn.
SH	Indicates standard hardware
SL	Shakeproof Lock Washer Co. Chicago, Illinois
W	Westinghouse Elec. & Mfg. Co. Cleveland, Ohio

[AG 300.7 (28 June 1943)]

By order of the Secretary of War:

G. C. MARSHALL,
Chief of Staff.

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The Adjutant General.

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